SCH4U – pH and pOH Calculations

1. What is the [H3O+] in a 0.025 M solution of NaOH? Is this solution acidic, basic or neutral?

2. Because rain washes pollutants out of the air, the lakes in many parts of the world are undergoing changes in pH. In a New England state, the water in one lake was found to have [H+] = 3.2 x 10-5 M. Calculate the pH and pOH of the lake’s water and decide if it is acidic or basic.

3. A carbonated beverage was found to have a hydrogen ion concentration of 3.67 x 10-4 M. What the pH and pOH values of the beverage? Is it acidic, basic or neutral?

4. The water in which a soil sample had soaked overnight was found to have [OH-] = 1.47 x 10-9 M. What was the pH?

5. “Calcareous soil” is soil rich in calcium carbonate. The pH of such soil generally ranges from just over 7 to as high as 8.3. What value of [H+] corresponds to a pH of 8.3?

6. In one sample of blood at 25°C, [H+] = 4.6 x 10-8 M. Find the molar concentration of OH-, and decide if the sample is acidic, basic, or neutral?

7. Find the values of [H+] that correspond to each of the following values of pH. State whether each solution is acidic or basic.

a) 2.90 (approximate pH of lemon juice)

b) 10.81 (pH of milk of magnesia, a laxative)

8. An aqueous solution of sodium bicarbonate, NaHCO3, has a molar concentration of OH- of 7.8x10-6 M. What is its molar concentration of hydrogen ion? Is the solution acidic basic or neutral?

9. The [H+] is 3.16 x 10-10 M for the water in Manito Lake found in Northern Saskatchewan where many missions destined for Mars are tested. What is the [OH-], the pOH and is the lake acidic or basic?

Answers:

1. [H3O+] = 4 x 10-13 M; basic 6. [OH-] = 2.2 x 10-7 M; basic

2. pH = 4.49; pOH = 9.51 7. a) [H+] = 0.0013 M; acidic

b) [H+] = 1.55 x 10-11 M; basic

3. pH = 3.44; pOH = 10.56; acidic 8. [H+] = 1.3 x 10-9 M; basic

4. pH 5.17; acidic 9. [OH-] = 3.16 x 10-5 M; pOH = 4.5; basic

5. [H+] = 5.0 x 10-9 M